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29 MAR 2004

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

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Patents ADP number *(if you know it)* 68946004001

If the applicant is a corporate body, give the country/state of its incorporation — A GUERNSEY COMPANY

4. Title of the invention — TELECOMMUNICATIONS SERVICES APPARATUS AND METHOD

5. Name of your agent *(if you have one)* — D Young & Co

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

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Request for substantive examination *(Patents Form 10/77)*	0
Any other documents *(please specify)*	Facsimile Letter Dated 29 March 2004

11. I/We request the grant of a patent on the basis of this application.

Signature D Young Date 29 March 2004

D Young & Co (Agents for the Applicants)

12. Name and daytime telephone number of person to contact in the United Kingdom — Frances Goddard — 023 8071 9500

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TELECOMMUNICATIONS SERVICES APPARATUS AND METHOD

This invention concerns the field of mobile telecommunications and in particular the areas of voice and text communication. The invention discloses a technique whereby both innovative services and location privacy may be offered on existing mobile telephone networks. The invention is applicable in particular to the GSM mobile telephony system, although in principle the technique could be applied to other types of mobile network. GSM is well defined and specified by international standards, which define the functional blocks and the signalling messages that pass between them.

The present application acknowledges Prior art GB 0128721.8, and extends it to cover application to location privacy and usage privacy, particularly in respect of not disclosing location information to foreign SMSCs during mobile terminated message delivery.

The invention will now be described in the context of a text messaging service. GSM provides the Short Message Service (SMS) facility which allows short text messages to be sent between mobile stations. Message transmission occurs in two stages, the first being transmission of the message from the originating handset to a short message service centre (SMSC). Secondly, the SMSC then forwards the message to the destination mobile station. If the destination mobile station is unavailable then the SMSC stores the message and retries delivery later.

The GSM short message service is extremely popular and carries ever increasing levels of traffic world-wide. A large proportion of this traffic is ephemeral. However in some cases it would be desirable to be able to keep a permanent record of short messages, either sent or received. With the present GSM system this is difficult. Another useful but currently unavailable facility would be SMS diversion whereby short messages could be received on an alternative handset or diverted to a host system which could act upon the contents of a message. The present invention solves both of

these problems and opens up the possibility of many new types of service with both GSM and voice calls. Examples of uses for this invention include:

- Sending copies of Short Messages either transmitted or received by a subscriber to an email system for archiving purposes.
- Diversion of SMS to an alternative handset or to an equipment, e.g. for voice read-back.
- Lawful interception of SMS.
- Interception of incoming or outgoing voice calls for a subscriber for the purpose of, for example, recording the call.

It is known that short messages may be archived by transferring them from the handset into a computer using a data link and specialised software. However this process is slow and inconvenient.

It is known that Signalling Transfer Points (STPs) in the network are programmed to do address translation between global addresses and the addresses of specific equipments or groups of equipments. The STPs provide a level of indirection in network addressing.

It is desired to obtain access to the contents of all Short Messages delivered to or transmitted by subscribers of a given network, or to obtain access to the audio of all calls involving subscribers of a given network, by arranging for these communications to pass through an equipment or group of equipments. As will be described, access to mobile originated messages is straightforward using known techniques, but access to mobile terminated messages is not possible using present techniques. For voice calls, diversion of outgoing calls via an equipment is currently possible by the subscriber dialling a special number or code which causes the network to route the call accordingly. However diversion of incoming calls through an equipment is not possible using known techniques. The present invention allows access to mobile terminated messages, and to incoming calls. The ability to direct all messages or voice calls through a common equipment is very powerful and opens the possibility of a whole range of new applications.

The invention is now described in the context of Short Messages.

Two types of message need to be considered: those that are mobile originated, i.e. sent by the subscriber and those that are mobile terminated, i.e. received by the subscriber. In the mobile originated case, it is known that all messages sent by the subscriber will be delivered to the Short Message Service Centre (SMSC) in his home network. It is also known that STPs can be programmed to divert all mobile originated messages through an equipment for processing prior to being delivered to the SMSC. A suitable equipment for implementing the message processing is a Telsis SMS Router.

The global GSM system consists of a number of GSM networks. The network on which a subscriber is registered is known as his "home" network. When a subscriber sends a text message, the message is always delivered in the first instance to an SMSC in his home network. This is the case even when the subscriber is roaming on another network. The SMSC then queries the Home Location Register (HLR) of the destination subscriber's network and the message is then forwarded accordingly.

The global address of the SMSC is normally programmed into the subscriber's handset. This global address is interpreted by Signalling Transfer Points (STPs) in the GSM network in order to deliver the message to the appropriate equipment. The GSM network messaging involved in delivering a mobile originated message to the SMSC is shown in Figure 1.

STPs in the home network can be re-programmed to divert all mobile originated Short Messages to an alternative equipment or group of equipments which can process Short messages before passing them on to the SMSC. This equipment then forwards the message onto the short message service centre. In this way the SMS Router is able to intercept all SMS traffic arriving at the SMSC. The SMS Router is therefore in a position where it is able to implement any type of processing on the SMS message, for example copying to an email archive. This is shown in Figure 2.

The mobile terminating case is more difficult because there is no guarantee that in normal circumstances messages delivered to a subscriber's handset will pass through the subscriber's home network at all. Solution of this problem is the key to this invention. It is known that in order to deliver a message to a subscriber, a query must be made to the HLR of the subscriber's home network in order to determine the current location of the subscriber. In the case of short messages this query is known as "send routing information for short message" or SRI_SM. It is also known that STPs can be programmed to divert signalling messages to an alternative destination. In some cases it is possible to divert SRI_SM messages (and the SRI equivalent messages to voice calls) without diverting other types of messages. The present invention makes use of this diversion by sending SRI_SM messages to the SMS Router.

Alternatively, the HLR can be programmed to forward some or all SRI_SMS to the SMS Router, excluding those arriving from the SMS Router. The SMS Router is then able to reply to these queries on behalf of the HLR, while also itself querying the HLR to determine the true location of the recipient. However instead of returning the true location of the subscriber the SMS Router can return its own location in the response to the SRI_SM. The effect of this is that the short message will be delivered not to the subscriber but to the SMS Router. This is true regardless of the current locations of either the sender or the recipient. The SMR Router is then able to implement any desired processing on the text message for example archiving to email, before finally optionally forwarding the message onto the actual location of the subscriber as indicated on the HLR. This behaviour is illustrated in Figure 3 and the corresponding ladder diagram in Figure 4.

In Figure 4, the HLR query (2) is shown being made immediately the SRI_SM message arrives at the SNS Router. In practice, since the HLR response is not used until step (5), the HLR query may be delayed until after step (3), or delayed until after step (4). The reply may be sent before or after the HLR is queried, and before of after the HLR response is received.

The combined effect of using the presently known technique for mobile originated SMS and using the present invention for mobile terminated SMS is that all messages to and from a subscriber may be caused to pass through an SMS Router before reaching their destination. The SMS Router is capable of acting on the contents or addresses within the message to provide additional intelligent functionality in the network, such as message archiving or grooming.

Very similar techniques can be used for voice calls. Instead of the SRI-SM message used for SMS, voice calls are delivered to the correct mobile station using an SRI message (Send Routing Information) directed at the HLR. If the STPs are programmed to divert SRI messages to the SMS Router, then the same principle can be used to cause incoming voice calls to be diverted via, for example, call screening equipment, a recording equipment which could make a recording in the manner described in UK Patent application number 0024733.8, or any other enhanced voice service. Outgoing voice calls may be diverted to the equipment by known techniques, for example the use of short dialling prefixes.

It is recognised that the above description, which is substantially in common with GB 0128721.8 does not adequately disclose the benefits and techniques of privacy that can easily be offered by a network that implements that invention.

Text message delivery is unique in that messages are stored in Service Centres (SMSCs) in the sender's network. If the sender is a subscriber of a foreign network, then the message is stored in an SMSC outside of the recipient's network. In the normal course of message delivery, the foreign SMSC queries the recipient's HLR, and obtains the recipients IMSI and current location. or an indication that the subscriber is absent. This information may violate the recipient's desire for privacy, especially if he is travelling. The described invention may be adapted as follows to overcome this privacy issue.

In its simplest form, the redirection of the mobile terminated message to an SMS Router in the recipient's network provides privacy, in that the foreign SMSC is always

told that the recipients 'location' is the SMS Router. No information is therefore provided to a foreign network that discloses the recipient's real location.

GB 0128721.8 describes this redirection being performed in order to allow addition processing on the message, for example for the purposes of archiving or copying the message, with optional forwarding of the message on to its originally intended destination. However for privacy purposes, no additional processing of the message is required, since privacy is afforded by the act of redirection. The redirected message would then normally be forwarded on to its originally intended destination, although other delivery methods could be used. Of course, the two techniques of processing and forwarding can be combined, but this combination is anticipated by GB 0128721.8.

In the simplest privacy scenario, the SMS Router takes delivery of an MT message from a foreign SMSC, but does not acknowledge it immediately. It then attempts to forward it on to its intended destination by normal means. If that forward fails, for example because the intended destination is not available, then a negative acknowledgement is sent back to the SMSC, and the usual Message Waiting and retry mechanisms will occur. If the delivery is successful, then the SMSC is acknowledged (a late acknowledgement).

The above scenario provides location privacy, but not absence privacy. Further privacy may be achieved by the SMS Router taking on the role of a store in the home network. When an MT message is offered to the SMS Router, then the router accepts it (possibly subject to validity and number portability checks) and positively acknowledges the SMSC immediately (an early acknowledgement). The SMS Router then takes charge of delivery, and stores any message itself that cannot be delivered immediately. Absence privacy is now achieved, because the destination always appears to succeed from the point of view of the foreign SMSC.

There is a change in the behaviour of SMS delivery reports, since the sender will be informed that the message has been delivered once it has been accepted by the SMS Router, but this is a side effect that is consistent with the desired 'absence privacy'.

Further enhancements are possible that allow selective application of privacy rules. For example, when the recipient is travelling, he may wish to keep private that he is on an aeroplane by not disclosing the fact that his phone is switched off. Consequently the SMS Router could selectively use early or late acknowledgement techniques according to rules. The rules could be provisioned by the subscriber or configured by other means, for some or all subscribers.

The application of privacy is potentially very useful, especially in a sensitive political climate, since the inadvertent disclosure of location or absence information to a foreign SMSC could have security implications for certain phone users.

GLOSSARY

SMS	Short Message Service of the GSM mobile telephone system
SMSC	Short Message Service Centre
SMS Router	Equipment which embodies the invention and filters and responds to certain signalling messages.
HLR	Home Location Register

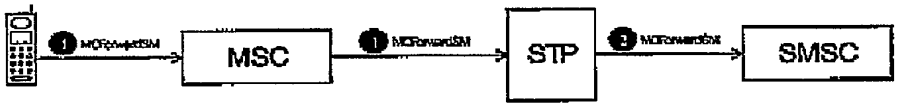

Figure 1

Normal delivery of mobile originated message to SMSC

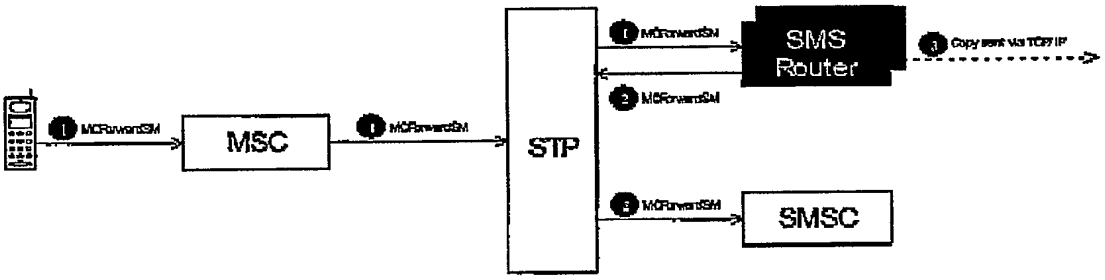

Figure 2

Intercepted delivery of mobile originated message

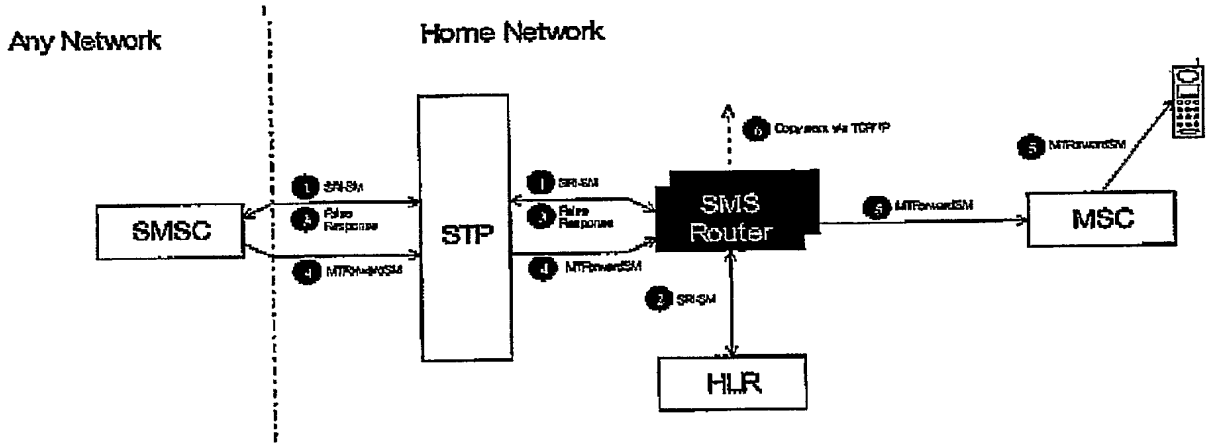

Figure 3.

Intercepted delivery of mobile terminated message

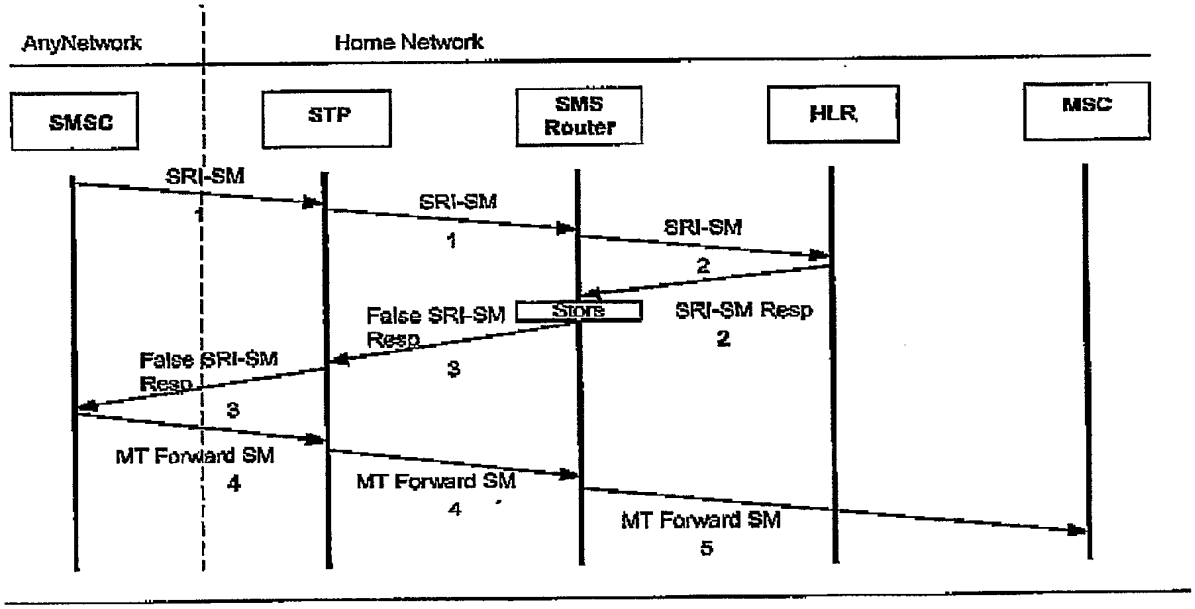

Figure 4

Ladder Diagram of Intercepted mobile-terminated message